

REMARKS

Claims 7-20 are pending in the present application. In the Office Action, claims 13, 15, and 17 were rejected under 35 U.S.C. §112, first paragraph, as not being enabled. In addition, claims 7-20 were rejected under 35 U.S.C. §103(a), as being unpatentable. Specifically, claims 7, 8, 10, 12-14, 16, and 19 were deemed unpatentable over a combination of Van Liempd et al. (EP 0 0091 648), Maier et al. (FR 2,808,619) and Seiler (US 4,178,619), and claims 8, 11, 15, 17, 18, and 20 were deemed unpatentable over that same combination and further in view of Saunders (US4,633,362).

In this response, Applicants have amended claims 13 and 15-17 to clarify the recited subject matter.

Claims 7-20 continue to be pending. Reconsideration of the application in view of the amendments and the following remarks is respectfully requested.

Rejections under 35 U.S.C. §112:

Claims 13, 15, and 17 were rejected under 35 U.S.C. §112, first paragraph, as not being enabled.

Applicants have amended claims 13 and 15-17 to more clearly recite that the input of the threshold circuit is connected to the timer. Applicants respectfully submit that claims 13, and 15-17 are now consistent with the written description and drawings and are fully enabled by the specification.

Applicants thank the Examiner for pointing out the inconsistency with the specification of the previous versions of those claims. Withdrawal of the rejections to claims 13, 15, and 17 under 35 U.S.C. §112 is respectfully requested.

Rejections of claims 7, 8, 10, 12-14, 16, and 19 under 35 U.S.C. §103(a):

Specifically, claims 7, 8, 10, 12-14, 16, and 19 were deemed unpatentable over a combination of Van Liempd et al. (EP 0 0091 648), Maier et al. (FR 2,808,619) and Seiler (US 4,178,619).

Van Liempd describes an energizer circuit for magnetic valves in metering devices the are excited by pulses. The energizing coil L of the magnetic valve can be connected via two switch

paths in series initially to a higher voltage trigger current source U1 and after opening of the valve to a maintaining current source U2 at a lower voltage. The changeover takes place via a timer (R, C, T1) or via a sensor circuit sampling the position of the moving magnetic core. The timer is connected upstream of a switching transistor connecting the energizing coil to the trigger current source U1 as an individual pulse transmitter.

Maier et al. describes an electronic operating mechanism for electromagnetic circuit switching having a voltage U_v applied across a coil 7 for a time 6 with a regulated current I . The voltage is provided by a rectifier 4 connected to a voltage sector U_n .

Seiler et al. describes a protective integrated circuit network to permit integration of a control circuit to switch an inductive load and to protect the integrated control circuit against inductive voltage kicks, voltage surges, and reverse polarity.

The invention described and claimed in the present application is directed to a control circuit for an electromagnetic operating mechanism that has an operating coil, a magnetic core and an armature. Independent claim 7 recites a control circuit for an electromagnetic operating mechanism that includes, among other features;

a timer;

a first electronic switching device including a voltage follower and including a first output connected in series with an operating coil of the electromagnetic operating mechanism, the first electronic switching device being configured to activate for a duration of a pickup phase of the electromagnetic operating mechanism after a control voltage has been applied via the timer;

a second electronic switching device including a switching path connected in series with the operating coil, the second electronic switching device being turned on while the control voltage is present;

a rectifier circuit connected to a control input, the rectifier circuit including a second output and being configured to supply a smoothed operating voltage at the second output;

a step-down DC voltage converter connected downstream of the rectifier circuit, the step-down DC voltage converter including a third output and being configured to supply a smoothed holding voltage at the third output; and

a voltage source controllable by the timer and configured to activate the first electronic switching device by a pickup voltage;

wherein:

the timer is activatable by a ramping up of the operating voltage;

the operating coil and the switching path of the second electronic switching device form a series circuit connected to the first output;

the series circuit and the first electronic switching device are suppliable with the operating voltage; and
the third output, the first output, and a control input of the second electronic switching device are interconnected, the third output being interconnected via a forward biased isolation diode.

Applicants respectfully submit that the combination of Van Liempd et al. Maier et al. and Seiler et al. do not teach or suggest at least the feature of a third output (i.e. output of a voltage converter), first output (i.e. output of the first switching device) and the control input of the second switching device being interconnected with the third output being interconnected via a forward biased isolation diode. As described in Applicants specification, and shown in Fig. 1, the interconnection between switching elements and the voltage converter via the isolation diode, given the functioning of the rest of the circuit, is what enables the pickup current to energize the coil during the pickup phase and enables the holding current to reach the operating coil during the holding phase. See, for example, paragraphs [0015] and [0016] and Fig. 1.

As admitted by the Examiner, neither Van Liempd et al. nor Maier et al. teach the interconnections and isolation diode as recited in claim 7. Instead the Examiner relies on Seiler et al. and the protecting diode 23 connected between the upper terminal of a triode 28 and the control input of the triode. See Seiler et al. Fig. 4. Applicants respectfully submit that his disclosure of Seiler et al. does not teach the interconnection and isolation diode features recited in claim 7. First, the isolation diode of claim 7 is recited as interconnecting an output of a dc voltage converter. Seiler instead teaches a diode 23 being disposed between the input and control terminal of a triode (switch) 28. Second, the Seiler et al. protective diode 23 is biased against the direction of the supply voltage at terminal J. Claim 7, by contrast recites a forward biased isolating diode interconnecting the output of the voltage converter.

Furthermore, the teaching of the protective diode 23 in Seiler is not at all relevant to the isolation diode described and claimed in Applicants specification. The purpose of the forward biased isolation diode 24 described in the specification and shown in Fig. 1, is to enable the holding voltage to reach the terminal 18 of the coil only when the higher pickup voltage is no longer present. By contrast, the protective diode of Seiler et al., according to the Examiner, is for protecting the switches against overvoltages.

Accordingly, Applicants respectfully submit that the combination of all three references fails to teach or suggest the interconnection interconnections and isolation diode features as recited in claim 7. Furthermore, Applicants submit that the teachings of Seiler are not relevant to the claimed invention and therefore would not be properly combinable with the other two references in the manner asserted by the Examiner. Withdrawal of the rejections to claims 7, 8, 10, 12-14, 16, and 19 under 35 U.S.C. § 103(a) is respectfully requested.

Rejections of claims 8, 11, 15, 17, 18, and 20 under 35 U.S.C. §103(a):

Claims 8, 11, 15, 17, 18, and 20 were deemed unpatentable over the combination of reference discussed in the preceding section and further in view of Saunders (US4,633,362).

Applicants respectfully submit that Saunders does not cure the deficiency of the Van Liempd, Maier, and Seiler combination. Specifically, Saunders also fails to recite the interconnection and isolating features recited in independent claim 7.

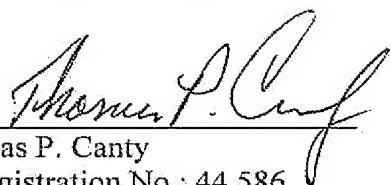
Withdrawal of the rejections to claims 8, 11, 15, 17, 18, and 20 under 35 U.S.C. § 103(a) is respectfully requested.

CONCLUSION

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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